$$F(a,\ a,\ d,\ d)=f(a,\ a,\ d,\ d)f'(a,\ a,\ d,\ d)=12a^2d^2-2a^4-2d^4.$$

That is, $12a^2d^2-2a^4-2d^4$ must be resoluble into two rational factors in a and d, since neither $f(a,\ a,\ d,\ d)$ nor $f'(a,\ a,\ d,\ d)$ can equal unity. It is evident however that $12a^2d^2-2a^4-2d^4$ does not possess this property.

GEOMETRY.

190. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

Find the locus of the centers of sections of an ellipsoid by planes which are at a constant distance from the center.

Solution by the PROPOSER.

The center of the ellipsoid being the origin, and $(\alpha,\ \beta,\ \gamma)$ being the center of the section, its equation is found to be

$$\frac{\alpha}{a^2}x+\frac{\beta}{b^2}y+\frac{\gamma}{c^2}z-\left(\frac{\alpha^2}{a^2}+\frac{\beta^2}{b^2}+\frac{\gamma^2}{c^2}\right)=0....(1).$$

The perpendicular from the center of the ellipsoid upon it is

$$\left(\frac{\alpha^2}{a^2}+\frac{\beta^2}{b^2}+\frac{\gamma^2}{c^2}\right)\div\sqrt{\left(\frac{\alpha^2}{a^4}+\frac{\beta^2}{b^4}+\frac{\gamma^2}{c^4}\right)}=k,$$

a constant, by the problem. This gives the required locus, which, by rationalizing, is easily seen to be a surface of the fourth degree.

Excellent solutions were also received from *PROFESSORS ZERR, WALKER*, and *SCHEFFER*.

CALCULUS.

151. Proposed by J. SCHEFFER. A. M., Hagerstown, Md.

Integrate the differential equation, $xy\dfrac{\partial^2 z}{\partial x.\partial y}=bx\dfrac{\partial z}{\partial x}+ay.$

Solution by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

Let $x=e^u$, $y=e^v$; then with $x\dfrac{d}{dx}=\theta$, $y\dfrac{d}{dy}=\theta'$, the given equation reduces to $\theta(\theta'-b)z=ae^v....(1)$, in which u and v are the independent variables.

The integral of (1) is